

Aquifer Characteristic Of The Lafia Sub Basin Of The Middle Benue River Basin, Nasarawa State, Nigeria.

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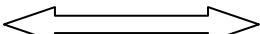
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-----Abstract-----

Hydro geological investigation was employed in the study using schlumberger electrode spacing configuration, with varying electrode separation to determine the Lithologic units, geological Formation and depths to water table of Lafia sub basin in the lower Benue River Valley. The hydro geological investigation carried out revealed the predominance of sandstone of different sizes and colours down to the depth of 220 feet in the area. After exploration and during the exploitation, the borehole cuttings show that Aquiferous Lafia sandstone has argillites dominating the studied Area, below the thin arenaceous beds. It was also discovered that the upper Aquifer of Lafia sandstone includes, the top sand of the Awgu Geological Formation which comprises of grey bedded shales with occasional sandstone beds and limestone in the studied area. The investigation has provided the hydro geophysical characteristic of the Aquifers of Lafia sub-basin formation within the lower Benue river Basin. This study will directly serve as a useful guide in prospecting for groundwater resources in the area.

Key Words: Aquifer, Lithology, Hydro Geological Survey, Drilling, Lafia Sub Basin Formation,

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1. Introduction

In Nigeria, and most of Developing countries groundwater studies management and development are still not seriously considered. Federal, state and local Government including individuals and politicians are busy drilling boreholes with little or no consideration to hydrogeology, fluid mechanic and its relationship with the host rocks and lithologic Formations. It has been observed that most drillers tend to drill boreholes in areas that is being recharged by lacerates landfills, polluted surface Rivers, even at time in old cemeteries/ graveyards and abandoned sucker pits and sewage systems. There is a serious lapse in groundwater development in Nigeria with a lot of abortive boreholes being drilled. Drilling boreholes is now, all comers affairs -therefore there is need for proper studies of underground formation and most of all Government of Nigeria should re-introduced order in groundwater development and management.

2. Location Of The Study

The study area is within the lower Benue River basin. It covers an area of about 146,900 Sq Km, which include, the lower part of the Benue valley from river wage, dawn to the confluence of the Benue and Niger rivers to the south. Lafia sub-basin is part of the lower Benue River valley, and this is where the investigation was carried out.

Table 1 Geological Formation in the lower Benue River Basin

MIDDLE BENUE AGE	Lafia Basin	UPPER BENUE AGE	Gombe Basin	LAU BASIN
Paleocene	volcanics	volcanics	Volcanics	Volcanics
Maastrichtian	Lafia Formation	Gombe Sandstone	Gombe Sandstone	Lamja Sandstone
Senonian	Awgu formation	Pindiga Shales with thin sandstone	Pindiga Shales with thin sandstone	Numanha Shales
TURONIAN FORMATION	EZEAKU/MAKURDI	PINDIGA SHALES	PINDIGA SHALES	JESSU/DUKUL
Turonian	Keana formation	Yolde formation	Yolde formation	Yolde formation
Cenomanian	Awe Formation	Bima sandstone	Bima sandstone	Bima sandstone
Mid-Late-Albian	Asu River Formation	Asu river Formation	Asu river Formation	Asu river Formation
	Basement	Basement	Basement	Basement

3. Hydrogeology Of Lafia Sub-Basin

Lafia area, an analysis of the groundwater disposition within the sub basin showed the existence of a groundwater divide the Agyaraga Divide, which separate the Lafia sub-basin from the main centre of the Giza basin. There is a lot of spring water in the studied area. This is due to contact with the underlying

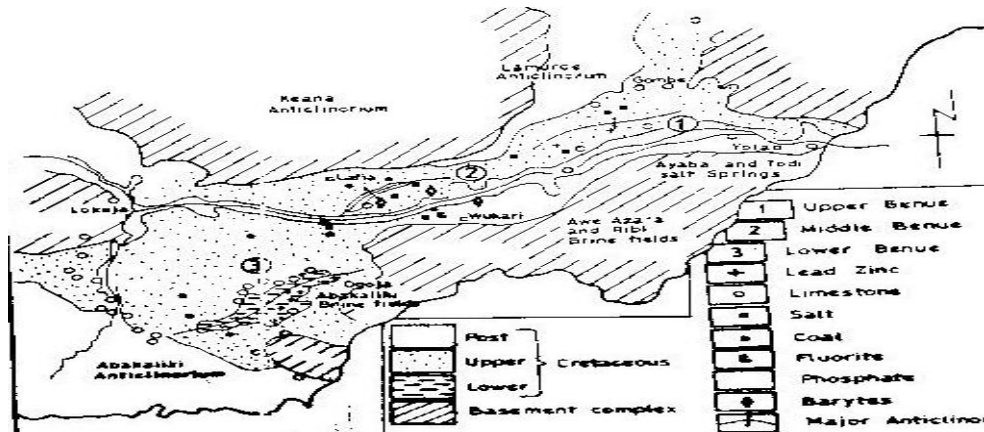


Figure 1: Map showing the study Area.

4. Methodology

In the area studied, the electrical resisting probes, a means of hydro geological investigation was employed using schlumber electrode spacing configuration, with varying electrode separation to determine the Lithologic units and geological formation and depths to water table. The Borehole drilled after the hydro geological survey by pacific geological Nigeria Company at first bank Lafia branch enabled the author the assessment of the groundwater's potential and Hydro geological characteristics of the sandstone Aquifer of the Lafia sub-basin of the middle Benue River Basin.

5. Result And Analysis

The hydro geological investigation carried out revealed the predominance of sandstone of different sizes and colours down to the depth of 220 feet in the area of Jos Road Lafia in Nassarawa states, Nigeria. The Aquiferous Lafia sandstone has argillites dominating the studied Area, below the thin arenecous beds. It was also discovered that the upper Aquifer of Lafia sand stone includes the top sand of the Awqu Geological Formation which comprises of grey bedded shales with occasional sandstone beds and limestone.

BOREHOLES CHARACTERISTICS OF THE STUDIED AREA

- (1) Site Location: First bank branch Lafia, Nassarawa state
- (2) Description of the site: Situated along Jos/Markurdi Road, Lafia Township, Nasarawa state.
- (3) Purpose: Water supply to the first bank staff and customers
- (4) Total Depth :220 Feet
- (5) Rocks penetrated: Lafia - Awqu Formation
- (6) Casing sizes: 5 inches complete 10 bar
- (7) Screen used: U PVC Screens – 2 lengths of screen by 20 feet each
- (8) Static water Level: Yield 3 liters/ see, with 2 horse power pump.
- (9) Pump installation-:Depth 180 feet
- (10) Physical quality of the water :Clear sand and particle free
- (11) Drawdown: 90 ft 1 hours pumping at 4 liters per seconds
- (12) Draw down stabilizers: It stabilized 1 hour, 15 minutes

BOREHOLE CUTTINGS / LITHOLOGICAL UNITS ENCOUNTERED.

Descriptions with 20 feet length of drilling pipes

- 0-20 Red lateritic formation
- 20-40 Sandstone, brown, fine to coarse
- 40-60 Sand clayed at the top
- 60-80 Sand, pebbly blackish

80-100 Sand fine to coarse pebbly
100-120 Sand fine to coarse
120-140 Sand fine to coarse pebbly
160-180 Clay sandy
180-200 Sandy blackish to grey
200- 220 Sand fine to medium whitish

Bottom of the hole

Logged by Nwabinele Emmanuel O. Hydrogeologist

6. Summary And Conclusion

The investigation has provided the hydro geophysical characteristic of the Aquifers of Lafia sub-basin formation within the lower Benue river Basin. The investigation also shows the depth to saturated Rock formations, the water table and the different geo-electric sections encountered. This study will directly serve as a useful guide in prospecting for groundwater resources in the area.

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